

REMARKS

This amendment is responsive to the Final Office Action dated May 16, 2007. Claims 19 - 22 are pending in this application and have been rejected. Reconsideration is respectfully requested.

Specification

Applicant appreciates entering of the amendment to the specification.

Claim Rejections - 35 USC § 112

Claim 22 has been rejected under 35 USC § 112 (first paragraph) as failing to comply with the written description requirement. In response, applicant has amended claim 22 to differentiate between the electrochemical detector and the separate item recitation of the separate element, which is the ultraviolet absorption detector that is recited as a separate element. This conforms to Figure 6 that shows the electrochemical detector (22) and the UV absorption detector (24). See also, applicant's original claim 18 and the description in the specification on lines 26 - 31 at page 6.

Amended Claim 21

Applicant has amended claim 21 to delete the phrase "of feeding a second mobile phase." Upon review of the claims, it appeared that this clause had no real meaning in the claim, and that it's deletion does not change the meaning of the claim. It is respectfully requested that the examiner telephone the undersigned immediately if this amendment is not acceptable.

Claim Rejections - 35 USC § 102(b)Claims 19 - 21

Applicant respectfully traverses the rejections under 35 USC § 102(b) as being unpatentable in view of Edlund.

In applicant's claims 19, 20 and 21, applicant claims "a reduction column for reducing (claim 21) and reducing using a reduction column (claim 19).

In the Office Action, the examiner has asserted that Edlund meets the claimed limitation by stating that:

The detection system employed by Edlund comprises a coulometric system, whereby once the sample has been purified and condensed, it is oxidized, then reduced and then reoxidized, and is measured at each step (Office Action, page 5, lines 2 - 4).

In this rejection, the examiner has not addressed the complete claim limitations. Applicant claims in both claims 19 and 21 a reduction column. Instead, the examiner has seized on

the word "reduction" as that term is used in Edlund. However, the reduction in Edlund takes place not in a column, but in an electrolytic cell. There are three coulometric cells shown at page 89 of Edlund which are +0.5 volts, -0.5 volts and +0.3 volts. These precede the UV detector that operates at 215 nm. In the description of the detection system, there are described "three coulometric working electrodes and one UV detector coupled in series." These three coulometric working electrodes are included in the three coulometric cells shown on Figure 1. There is no teaching or suggestion in Edlund that the coulometric working electrodes are columns. They are not. Instead, Edlund teaches that the columns are C<sub>1</sub> and C<sub>2</sub> shown in Figure 1. Edlund does not identify the electrodes as columns.

Edlund is consistent with the use of the term column in the chromatography art. Please see attached McGraw-Hill Dictionary of Scientific and Technical Terms, sixth edition, page 434 that defines column in chromatography as a tube holding a stationary phase through which the mobile phase is passed. Also attached is a page from the American Press Dictionary of Science and Technology, which defines column chromatography as a separation technique employing a column packed with a stationary phase through which a mobile phase containing a mixture is poured. Applicant in specifying that the reduction uses a reduction column or that a reduction column is used for reducing, has specified a column as that term is used in the chromatography

arts. Applicant's use of the term column is consistent with the dictionaries that are attached, as well as consistent with Edlund who uses that term only with respect to  $C_1$  and  $C_2$  and not in connection with the electrodes. Edlund makes his distinction particularly clear at the bottom of page 89 where he states, "The column-switching events were controlled. . ." Here Edlund is referring to the switching for columns  $C_1$  and  $C_2$ . Because Figure 1 and Table 1 of Edlund disclose that a switching valve  $V^2$  conducts column switching between connection of columns  $C_1$  and  $C_2$  and disconnection of columns  $C_1$  and  $C_2$ , rather than column-switching between columns  $C_1$  and  $C_2$ . This is further consistent with the use of column in the chromatography art.

Since Edlund does not disclose that the three electrode cells (+0.5V, -0.5V and +0.3V) are columns, there is simply no claimed reduction column. For this reason there is no anticipation.

The second coulometric working electrode (-0.5V) is suggested by the examiner to teach a reduction. However, Edlund teaches that reduction is made at the second coulometric working electrode with respect to  $\text{CoQ}_{10}\text{H}_2$  and  $\text{CoQ}_{10}$ . This coulometric electrode simply does not have a stationary phase (see "Detection System" at page 90 of Edlund). It is not a chromatography column.

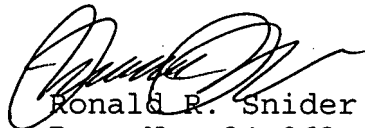
For the foregoing reason, Edlund does not anticipate.

Claim 22

Claim 22 is dependent from claim 21 and is, therefore, patentable for the same reasons discussed above with respect to claim 21 and is clearly not anticipated.

In view of the foregoing, it is respectfully submitted that the application is now in condition for allowance, and early action in accordance thereof is requested. In the event there is any reason why the application cannot be allowed in this current condition, it is respectfully requested that the Examiner contact the undersigned at the number listed below to resolve any problems by Interview or Examiner's Amendment.

Respectfully submitted,



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Date: August 16, 2007

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# **McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS**

**Sixth  
Edition**

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On the cover: Representation of a fullerene molecule with a noble gas atom trapped inside. At the Permian-Triassic sedimentary boundary the noble gases helium and argon have been found trapped inside fullerenes. They exhibit isotope ratios quite similar to those found in meteorites, suggesting that a fireball meteorite or asteroid exploded when it hit the Earth, causing major changes in the environment. (Image copyright © Dr. Luann Becker. Reproduced with permission.)

Over the six editions of the Dictionary, material has been drawn from the following references: G. M. Garrity et al., *Taxonomic Outline of the Prokaryotes*, Release 2, Springer-Verlag, January 2002; D. W. Linzey, *Vertebrate Biology*, McGraw-Hill, 2001; J. A. Pechenik, *Biology of the Invertebrates*, 4th ed., McGraw-Hill, 2000; U.S. Air Force Glossary of Standardized Terms, AF Manual 11-1, vol. 1, 1972; F. Casey, ed., *Compilation of Terms in Information Sciences Technology*, Federal Council for Science and Technology, 1970; *Communications-Electronics Terminology*, AF Manual 11-1, vol. 3, 1970; P. W. Thrush, comp. and ed., *A Dictionary of Mining, Mineral, and Related Terms*, Bureau of Mines, 1968; *A DOD Glossary of Mapping, Charting and Geodetic Terms*, Department of Defense, 1967; J. M. Gilliland, *Solar-Terrestrial Physics: A Glossary of Terms and Abbreviations*, Royal Aircraft Establishment Technical Report 67158, 1967; W. H. Allen, ed., *Dictionary of Technical Terms for Aerospace Use*, National Aeronautics and Space Administration, 1965; *Glossary of Stinfo Terminology*, Office of Aerospace Research, U.S. Air Force, 1963; *Naval Dictionary of Electronic, Technical, and Imperative Terms*, Bureau of Naval Personnel, 1962; R. E. Huschke, *Glossary of Meteorology*, American Meteorological Society, 1959; *ADP Glossary*, Department of the Navy, NAVSO P-3097; *Glossary of Air Traffic Control Terms*, Federal Aviation Agency; *A Glossary of Range Terminology*, White Sands Missile Range, New Mexico, National Bureau of Standards, AD 467-424; *Nuclear Terms: A Glossary*, 2d ed., Atomic Energy Commission.

**McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS,  
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**color transmission** [COMMUN] In television, the transmission of a signal wave which represents both the brightness values and the chromaticity values in the picture. ( 'kəl-ər tranz'mish-ən )

**color triangle** [OPTICS] A triangle on a chromaticity diagram that represents the range of chromaticities that can be obtained as additive mixtures of three prescribed primary colors represented by the corners of the triangle. ( 'kəl-ər 'trɪ,æŋ-gəl )

**color vision** [PHYSIO] The ability to discriminate light on the basis of wavelength composition. ( 'kəl-ər 'vɪʒ-ən )

**colossal magnetoresistance** [SOLID STATE] A very large magnetoresistance associated with magnetic phase transitions in certain homogeneous materials, particularly a class of rare-earth perovskite manganites. ( kə'lās-əl mag,ned-ə-ri'zɪs-təns )

**Colossendelidae** [INV ZOO] A family of deep-water marine arthropods in the subphylum Pycnogonida, having long palpi and lacking chelifores, except in polymerous forms. ( kəl-ə-sen'dē-ə,dē )

**colostomy** [MED] Surgical formation of an artificial anus by joining the colon to an opening in the anterior abdominal wall. ( kə'lās-tə-mē )

**colostrum** [PHYSIO] The first milk secreted by the mammary gland during the first days following parturition. ( kə'lās-trəm )

**colotomy** [MED] Incision of the colon; may be abdominal, lateral, lumbar, or iliac, according to the region of entrance. ( kə'lād-ə-mē )

**Colpitts oscillator** [ELECTR] An oscillator in which a parallel-tuned tank circuit has two voltage-dividing capacitors in series, with their common connection going to the cathode in the electron-tube version and the emitter circuit in the transistor version. ( 'kɒl,pɪts ,ɪs-ə,ləd-ər )

**colposcope** [MED] An instrument for the visual examination of the vagina and cervix; a vaginal speculum. ( kəl-pə-skɒp )

**colposcopy** [MED] Visual examination of cells of the vagina and cervix by means of an endoscope. ( kəl'pɒs-kə-pē )

**colpotomy** [MED] Incision of the vagina. ( kəl'pɒd-ə-mē )

**coulter** [AGR] A cutting tool attached to the moldboard plow beam for cutting the sward in advance of the plowshare. Also known as coulter; cutting coulter. ( 'kɒl-tər )

**Colubridae** [VERT ZOO] A family of cosmopolitan snakes in the order Squamata. ( kə'lju-brə,dē )

**Columba** [ASTRON] A constellation, right ascension 6 hours, declination 35°S. Abbreviated Col. Also known as Dove. ( kə'ləm-bə )

**Columbidae** [VERT ZOO] A family of birds in the order Columbiformes composed of the pigeons and doves. ( kə'ləm-bə,dē )

**Columbiformes** [VERT ZOO] An order of birds distinguished by a short, pointed bill, imperforate nostrils, and short legs. ( kə,ləm-bə'fɔr,mēz )

**columbite** [MINERAL] (Fe,Mn)(Cb,Ta)<sub>2</sub>O<sub>6</sub> An iron-black mineral with a submetallic luster that crystallizes in the orthorhombic system; the chief ore mineral of niobium (columbium); hardness is 6 on Mohs scale, and specific gravity is 5.4-6.5. Also known as daniite; greenlandite; niobite. ( kə'ləm,bɪt )

**columblum** See niobium. ( kə'ləm-bē-əm )

**columella** [ANAT] See stapes. [BIOL] Any part shaped like a column. [BOT] A sterile axial body within the capsules of certain mosses, liverworts, and many fungi. ( kəl-yə'mel-ə )

**column** [ANALY CHEM] In chromatography, a tube holding the stationary phase through which the mobile phase is passed. [CHEM ENG] See tower. [COMPUT SCI] A vertical arrangement of characters or other expressions, usually referring to a specific print position on a printer. [ENG] A vertical shaft designed to bear axial loads in compression. [GEOL] See geologic column; stalactite-stalagmite. [MATH] See place. [NUCLEO] A hollow cylinder of water and spray thrown up from an underwater burst of an atomic weapon, through which hot, high-pressure gases are vented to the atmosphere; a somewhat similar column of dirt is formed in an underground explosion. Also known as plume. ( 'kæl-əm )

**columnar epithelium** [HISTOL] Epithelium distinguished by

elongated, columnar, or prismatic cells. ( kə'ləm-nər ep-ə'thɛl-ē-əm )

**columnar ionization** [PHYS] Ionization of atoms in a region confined to one or more paths of very small cross-sectional area. ( kə'ləm-nər ,ɪ-ə-nə'zɪ-shən )

**columnar jointing** [GEOL] Parallel, prismatic columns that are formed as a result of contraction during cooling in basaltic flow and other extrusive and intrusive rocks. Also known as columnar structure; prismatic jointing; prismatic structure. ( kə'ləm-nər 'jɔɪnt-ɪŋ )

**columnar resistance** [GEOPHYS] The electrical resistance of a column of air 1 centimeter square, extending from the earth's surface to some specified altitude. ( kə'ləm-nər ri'zɪs-təns )

**columnar section** [GEOL] A vertical strip or scale drawing of the strip taken from a given area or locality showing the sequence of the rock units and their stratigraphic relationship, and indicating the thickness, lithology, age, classification, and fossil content of the rock units. Also known as section. ( kə'ləm-nər 'sek-shən )

**columnar stem** [BOT] An unbranched, cylindrical stem bearing a set of large leaves at its summit, as in palms, or no leaves, as in cacti. ( kə'ləm-nər ,stem )

**columnar structure** [GEOL] See columnar jointing. [MINERAL] Mineral structure consisting of parallel columns of slender prismatic crystals. [PETR] A primary sedimentary structure consisting of columns arranged perpendicular to the bedding. ( kə'ləm-nər ,strʌk-ʃər )

**column bleed** [ANALY CHEM] The loss of carrier liquid during gas chromatography due to evaporation into the gas under analysis. ( 'kæl-əm ,blēd )

**column chromatography** [ANALY CHEM] Chromatographic technique of two general types: packed columns usually contain either a granular adsorbent or a granular support material coated with a thin layer of high-boiling solvent (partitioning liquid); open-tubular columns contain a thin film of partitioning liquid on the column walls and have an opening so that gas can pass through the center of the column. ( 'kæl-əm ,krɒ-mə'tɪg-rə-fē )

**column crane** [MECH ENG] A jib crane whose boom pivots about a post attached to a building column. ( 'kæl-əm ,kraɪn )

**column development chromatography** [ANALY CHEM] Columnar apparatus for separating or concentrating one or more components from a physical mixture by use of adsorbent packing; as the specimen percolates along the length of the adsorbent, its various components are preferentially held at different rates, effecting a separation. ( 'kæl-əm də'veləp-mənt ,krɒ-mə'tɪg-rə-fē )

**column drill** [MECH ENG] A tunnel rock drill supported by a vertical steel column. ( 'kæl-əm ,drɪl )

**column formation** See trail formation. ( 'kæl-əm fɔr'meɪ-shən )

**column matrix** See column vector. ( 'kæl-əm ,mā-ˈtrɪks )

**column operations** [MATH] A set of rules for manipulating the columns of a matrix so that the image of the corresponding linear transformation remains unchanged. ( 'kæl-əm ,ɒ-pə'reɪ-shənz )

**column order** [COMPUT SCI] The storage of a matrix of  $m$  as  $a(1,1), a(2,1), \dots, a(m,1), a(1,2), \dots$  ( 'kæl-əm ,ɔr-də )

**column pipe** [MIN ENG] The large cast-iron (or wood) pipe through which the water is conveyed from the mine pump to the surface. ( 'kæl-əm ,pɪp )

**column printer** [COMPUT SCI] A small line printer used in some calculators to provide hard-copy printout of input and output data; typically consists of 20 columns of numerals and a limited number of alphabetic or other identifying characters. ( 'kæl-əm ,prɪnt-ər )

**column rank** [MATH] The number of linearly independent columns of a matrix; the dimension of the image of the corresponding linear transformation. ( 'kæl-əm ,ræŋk )

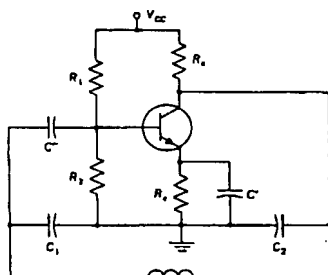
**column space** [MATH] The vector space spanned by the columns of a matrix. ( 'kæl-əm ,spēs )

**column splice** [CIV ENG] A connection between two lengths of a compression member (column); an erection device rather than a stress-carrying element. ( 'kæl-əm ,splɪs )

**column vector** [MATH] A matrix consisting of only one column. Also known as column matrix. ( 'kæl-əm ,vekt-ər )

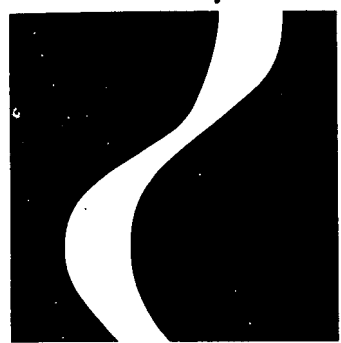
**colure** [ASTRON] A great circle of the celestial sphere through the celestial poles and either the equinoxes or solstices.

COLPITTS OSCILLATOR



A transistor Colpitts oscillator.





# Academic Press Dictionary of Science and Technology

Edited by  
Christopher Morris

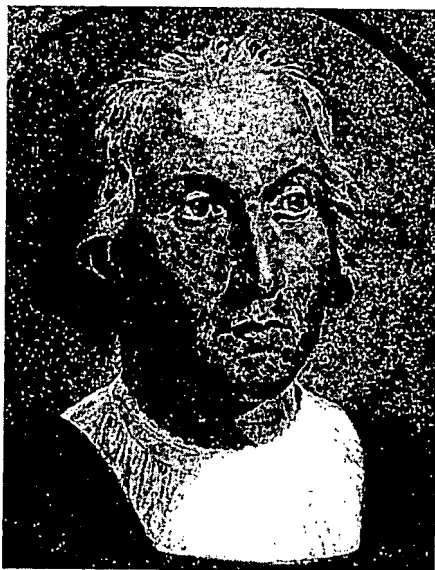


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Christopher Columbus

**Columbus, Christopher** 1451–1506, Italian navigator and explorer; his voyage to the West Indies in 1492 made the European community generally aware of the existence of the Americas.

**columnella** *Anatomy*. any of several columnlike structures, such as the septum or the central axis of the cochlea. *Botany*. a structure serving as a small central axis for certain root caps, fruits, and the sporangia of liverworts, mosses, and fungi. *Invertebrate Zoology*. a columnlike part, such as the central axis of a spiral univalve shell or the central pillar in the calyx of many corals. (A Latin word meaning "small column.")

**Columellaceae** *Botany*. a monogeneric family of bitter, tanniferous Andean shrubs and trees of the order Rosales, characterized by simple opposite leaves and a sympetalous corolla.

**column** *Architecture*. a vertical support, usually consisting of a base, shaft, and capital. *Engineering*. any vertical member used to support a compression load. *Military Science*. a formation of troops, ships, aircraft, or the like, in which the individual elements are placed and move one behind the other. *Computer Programming*. 1. a particular character or digit position in a field or on a physical device. 2. a vertical arrangement of data in a printed output. *Chemical Engineering*. a vertical, cylindrical container or vessel used in petroleum and chemical processing, usually to achieve a degree of separation of vapor-liquid or liquid-liquid systems by extraction, distillation, or absorption. *Nucleonics*. 1. in nuclear testing, the hollow cylinder of water or spray thrown up by an underwater burst of a nuclear weapon, through which hot, high-pressure gases are vented to the atmosphere. 2. a similar column of dirt formed in a shallow underground explosion. *Mathematics*. 1. a position corresponding to a power of the number base in positional representation of numerical value. Also, PLACE. 2. in an  $m \times n$  matrix with entries  $a_{ij}$ , the  $m$  values of  $a_{ij}$  for fixed  $j$  are called, collectively, the  $j$ th column.

**columnar coal** *Geology*. coal having a columnar fracture structure, usually as a result of metamorphism by an igneous intrusion.

**columnar epithelium** *Histology*. epithelium that is composed of elongated, columnar cells.

**columnar grain casting** *Materials Science*. a process of casting that controls the direction of grain growth, for applications such as blades and vanes for turbines and jet engines. Directional solidification results in a structure wherein the grain boundaries run in the longitudinal direction of the part.

**columnar ice** *Hydrology*. ice consisting of vertical columns of ice crystals massed together.

**columnaris disease** *Veterinary Medicine*. a disease caused by a member of the slime bacteria group *Flexibacter columnaris* and occurring in warm-water species of fish; prevention is often achieved by lowering the water temperature and avoiding traumatic injury. Also, COTTON-MOUTH DISEASE, SADDLEBACK.

**columnar jointing** *Geology*. in tabular bodies of igneous rock, a pattern of jointing produced as a result of contraction during cooling and characterized by the division of rocks into long, parallel prisms or pillars.

**columnar resistance** *Geophysics*. a measure of atmospheric electrical resistance in a column of air 1 centimeter square, measured from the earth's surface to a given altitude.

**columnar section** *Geology*. a scale drawing that graphically illustrates the vertical sequence and relationships of rock units occurring in a specific area.

**columnar stem** *Botany*. a cylinder-shaped stem having no branches and bearing leaves only at its apex.

**columnar structure** *Petrology*. a primary sedimentary structure with slender columns arranged perpendicular to the bedding.

**column bleed** *Analytical Chemistry*. the loss of carrier liquid during gas chromatography due to evaporation into the gas being analyzed.

**column chromatography** *Analytical Chemistry*. a separation technique employing a column packed with a stationary phase through which a mobile phase containing a mixture is poured; the components can be eluted and collected for analysis.

**column collapse** *Volcanology*. the collapse of a cloud column from a volcanic eruption, occurring when the density of the column exceeds that of the ambient atmosphere.

**column cover** *Military Science*. the protection of a column by aircraft in communication with the column; this may include reconnaissance or attack of targets threatening the column.

**column crane** *Mechanical Engineering*. a crane in which the projecting arm swings about a mast attached to one of the building's columns.

**column drill** *Mechanical Engineering*. a drilling machine supported by an upright steel column; used to excavate rock.

**column gap** *Military Science*. the space between two consecutive elements of a column; it may be measured in units of length or time.

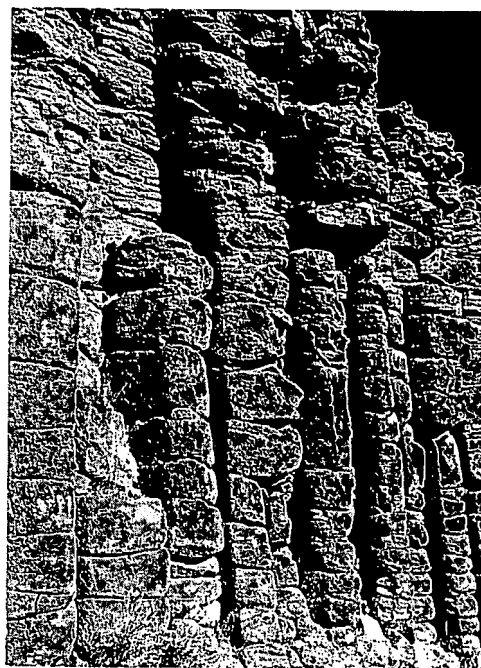
**column operations** *Mathematics*. the rules for manipulating the columns of a matrix representing a linear transformation so that the image space of the linear transformation is unchanged.

**column order** *Computer Programming*. a method of defining a matrix by naming the elements one column at a time, as opposed to row order. Also, column-major order.

**column pipe** *Mining Engineering*. the large pipe through which water is conveyed from a mine pump to the surface.

**column rank** *Mathematics*. the dimension of the column space of a matrix; equivalently, the number of linearly independent columns of the matrix. The column rank of a matrix equals the row rank.

**column space** *Mathematics*. given an  $m \times n$  matrix  $M = (a_{ij})$  over some field  $F$ , the column space of  $M$  is the subspace of  $F^m$  (the  $m$ -dimensional vector space over  $F$ ) spanned by the  $n$  columns of  $M$  regarded as vectors of  $F^m$ . The column space is the same (up to a change of basis) as the image space of the linear transformation corresponding to  $M$ .



columnar joint